

What is claimed is:

1. A ratchet mechanism for a wrench comprising:
a case having a first cavity and a second cavity, the first cavity being contiguous to the second cavity and the second cavity having at least a first ramped surface;
a main gear that rotatably resides in the first cavity, the main gear including a circular gear portion and a drive portion that extends from the center of the gear portion, the gear portion having a plurality of teeth;
a pawl that rotatably resides in the second cavity, the pawl including a pawl body shaped to have at least a first catch portion, the pawl being rotatably movable about a pawl axis to at least a first engaged position wherein the first catch portion of the pawl engages at least one of the teeth of the gear portion to prevent the gear portion from rotating in a first direction and the pawl being rotatable away from the engaged position to permit rotation of the gear portion in a second direction opposite the first direction; and
a biasing mechanism carried by the pawl, the biasing mechanism including at least one contact urged toward the ramped surface, the contact being movable along the first ramped surface, thereby rotationally biasing the pawl toward the first engaged position.
2. The ratchet mechanism of claim 1 wherein the biasing mechanism includes a coil spring.
3. The ratchet mechanism of claim 2 wherein the pawl includes a bore and wherein the coil spring resides generally within the bore.
4. The ratchet mechanism of claim 3 wherein the contact is a ball bearing positioned between the coil spring and the ramped surface.
5. The ratchet mechanism of claim 3 wherein the bore is generally parallel to the pawl axis.
6. The ratchet mechanism of claim 1 wherein the gear portion is rotatable about a main gear axis, and wherein the pawl axis is generally parallel to the main gear axis.

7. The ratchet mechanism of claim 1 wherein the ramped surface is recessed in the case.

8. The ratchet mechanism of claim 1 wherein at least a portion of the pawl has a planar top surface, a planar bottom surface, and a generally cylindrical sidewall extending between the planar top and bottom surfaces.

9. The ratchet mechanism of claim 1 wherein the pawl has a generally crescent-shaped concave surface having a radius about equal to an outermost radius of the gear portion.

10. The ratchet mechanism of claim 9 wherein the concave surface is operable to limit the rotational movement of the pawl away from the first engaged position.

11. The ratchet mechanism of claim 8 wherein each of the top and bottom surfaces of the pawl are perpendicular to the pawl axis.

12. The ratchet mechanism of claim 11, wherein the second cavity includes a generally planar floor surface and a generally planar ceiling surface, the floor and ceiling surfaces being positioned generally adjacent the top and bottom surfaces of the pawl, respectively.

13. The ratchet mechanism of claim 12, wherein at least a portion of the second cavity has a generally cylindrical wall, the cylindrical wall being generally perpendicular to the floor and ceiling surfaces of the second cavity, to guide the rotational motion of the pawl.

14. The ratchet mechanism of claim 13, wherein the ramped surface is located on the planar floor surface of the second cavity

15. The ratchet mechanism of claim 14 wherein at least another ramped surface is located on the planar ceiling surface of the second cavity.

16. The ratchet mechanism of claim 15, wherein the biasing mechanism includes two contacts, one of the contacts being urged toward the at least one ramped surface located on the floor surface, and the other contact being urged toward the ramped surface located on the ceiling surface.

17. The ratchet mechanism of claim 1 wherein the wrench is selectively operable in a reverse mode, the wrench further comprising:

a second ramped surface of the second cavity; and

a second catch portion of the pawl;

an externally accessible lever mounted to the pawl to move the pawl so that the biasing member moves from contact on the first ramped surface to the second ramped surface;

wherein in the reverse mode the pawl is rotatably movable to a second engaged position such that the second catch portion engages at least one of the teeth of the gear portion to prevent the gear portion from rotating in the second direction and the pawl being rotatable away from the engaged position to permit rotation of the gear portion in the first direction opposite the second direction; and

wherein the biasing mechanism urges the contact toward the second ramped surface, the contact being movable along the ramped surface, thereby rotationally biasing the pawl toward the second engaged position.

18. The ratchet mechanism of claim 17 wherein the first and second ramped surfaces define contact paths along the same circumference, separated by a ridge.

19. The ratchet mechanism of claim 18, wherein each of the first and second ramped surfaces slope downwardly away from the ridge.

20. A ratchet mechanism comprising:

a case having a first cavity and a second cavity, the first cavity being contiguous to the second cavity and the second cavity having at least a first ramped surface;

a main gear that rotatably resides in the first cavity, the main gear including a plurality of teeth;

a pawl that rotatably resides in the second cavity, the pawl being shaped to have at least a first catch portion, the pawl being rotatably movable about a pawl axis to at least a first engaged position wherein the first catch portion of the pawl engages at least one of the teeth of the main gear to prevent the main gear from rotating in a first direction and the pawl being rotatable away from the engaged position to permit rotation of the main gear in a second direction opposite the first

direction, wherein a bore extends through the pawl along a bore axis that is generally parallel to the pawl axis; and
a spring positioned within the bore;
a lower contact ball and an upper contact ball, the lower and upper contact balls being positioned at opposite ends of the spring, holding the spring in compression, whereby the spring urges the contact balls away from each other, at least one of the contact balls being urged into contact with the first ramped surface, and wherein the contact being movable along the first ramped surface to rotationally bias the pawl toward the first engaged position.

21. The ratchet mechanism of claim 20 wherein the case includes a unitary main portion and a cover plate being removably mounted to the main portion to provide access to the first and second cavities.

22. The ratchet mechanism of claim 20 wherein the ratchet mechanism is a ratchet head, whereby the case includes a throat configured to be mounted to a wrench handle.

23. The ratchet mechanism of claim 20 wherein at least a portion of the pawl has a cylindrical shape complementary to a shape of the cavity.

24. The ratchet mechanism of claim 20 wherein the pawl has a concave surface configured to make sliding contact against the main gear operable to limit the rotational movement of the pawl away from the first engaged position.

25. The ratchet mechanism of claim 20, wherein the second cavity includes a generally planar floor surface and a generally planar ceiling surface, the floor and ceiling surfaces being positioned generally adjacent the top and bottom surfaces of the pawl, respectively.

26. The ratchet mechanism of claim 25, wherein the ramped surface is located on the planar floor surface of the second cavity.

27. The ratchet mechanism of claim 26 wherein at least another ramped surface is located on the planar ceiling surface of the second cavity.

28. The ratchet mechanism of claim 27, wherein the lower contact ball is urged toward the at least one ramped surface located on the floor surface, and the upper contact is urged toward the ramped surface located on the ceiling surface.

29. The ratchet mechanism of claim 20, wherein the ratchet mechanism is selectively operable in a reverse mode, the mechanism further comprising:

a second ramped surface of the second cavity; and
a second catch portion of the pawl;
an externally accessible lever mounted to the pawl to move the pawl so that a contact ball moves from contact on the first ramped surface to the second ramped surface;

wherein in the reverse mode the pawl is rotatably movable to a second engaged position such that the second catch portion engages at least one of the teeth of the main gear to prevent the main gear from rotating in the second direction and the pawl being rotatable away from the engaged position to permit rotation of the gear portion in the first direction opposite the second direction; and

wherein the spring urges at least one of the contact balls toward the second ramped surface, the contact ball being movable along the second ramped surface, thereby rotationally biasing the pawl toward the second engaged position.

30. The ratchet mechanism of claim 29, wherein the first and second ramped surfaces define contact paths along the same circumference, separated by a ridge.

31. The ratchet mechanism of claim 30, wherein each of the first and second ramped surfaces slope downwardly away from the ridge.